«ETTORE MAJORANA» FOUNDATION AND CENTRE FOR SCIENTIFIC CULTURE
*TO PAY A PERMANENT TRIBUTE TO ARCHIMEDES AND GALILEO GALILEI, FOUNDERS OF MODERN SCIENCE AND TO ENRICO FERMI, THE "ITALIAN NAVIGATOR", FATHER OF THE WEAK FORCES*

# INTERNATIONAL SCHOOL OF NUCLEAR PHYSICS

## 42nd Course: *QCD UNDER EXTREME CONDITIONS FROM HEAVY-ION COLLISIONS TO THE PHASE DIAGRAM*

**ERICE-SICILY: 16 – 22 SEPTEMBER 2021**

**Sponsored by the: • Italian Ministry of Education, University and Scientific Research • Sicilian Regional Government**

### PROGRAMME AND LECTURERS

*Open heavy flavour in heavy-ion collisions*
• R. AVERBECK, GSI, Darmstadt, DE

*Nuclei, hypernuclei and exotica in relativistic nuclear collisions: access to the QCD phase diagram*
• P. BRAUN-MUNZINGER, GSI, Darmstadt, DE

*A new laboratory to study hadron hadron interactions*
• L. FABBIETTI, Technical University, Munich, DE

*Exploring microscopic properties of matter across the QCD phase diagram with dileptons*
• T. GALATYUK, GSI and TU Darmstadt, DE

*QCD phase diagram and the equation of state from the lattice*
• F. KARSCH, University of Bielefeld, DE

*QCD in the heavy dense regime*
• O. PHILIPSEN, University of Frankfurt, DE

*Charge Fluctuations and QCD phase boundary*
• K. REDLICH, University of Wroclaw, PL

*Quarkonia at the LHC as a probe of deconfinement*
• J. STACHEL, University of Heidelberg, DE

*Summary*
• H. STOECKER, University of Frankfurt am Main, DE

*Future opportunities with nuclear beams at the TeV scale*
• U. WIEDEMANN, CERN, Geneva, CH

PURPOSE OF THE COURSE

With high-energy heavy-ion collisions one can probe hot and dense nuclear matter and explore the equation of state and the phase diagram of the strong interaction. Dense and hot nuclear matter plays also an important role for supernova explosions, black hole formation and star mergers, which produce gravitational waves. The purpose of the meeting is to bring together experts and young researchers in the areas of nuclear, particle and astro-physics in order to discuss the current status and the pertinent interrelations among these fields as well as to explore future directions, both in experiment and theory. The aim is to cover a broad range of topics to elucidate synergies and identify areas of future progress. This should be especially beneficial to the younger participants of the meeting. In detail, the following topics will be presented and discussed: Phase diagram and equation of state of strong interaction matter; Phenomenology and size dependence of high-energy nuclear collisions; Lattice and continuum approaches to hot and dense QCD; Search for the QCD critical end point; Electromagnetic probes and spectral functions of hadrons in nuclear matter;

Quarkonia and open heavy flavors; Particle correlations and fluctuations; Nuclei, hyper-nuclei and exotica in heavy ion collisions; Jets, parton energy loss, and parton-medium interactions; QCD in large external magnetic fields and in rotating systems; Phase transitions in binary star mergers; Future hadron and lepton colliders.

APPLICATIONS
Persons wishing to attend the Course should register online at:

http://theorie.ikp.physik.tu-darmstadt.de/erice/
or
http://www.uni-tuebingen.de/erice/

• PLEASE NOTE
Participants must arrive in Erice no later than 7 p.m. on 16 September June 2021.

POETIC TOUCH

According to legend, Erice, son of Venus and Neptune, founded a small town on top of a mountain (750 metres above sea level) more than three thousand years ago. The founder of modern history — i.e. the recording of events in a methodic and chronological sequence as they really happened without reference to mythical causes — the great Thucydides (~500 B.C.), writing about events connected with the conquest of Troy (1183 B.C.) said: *«After the fall of Troy some Trojans on their escape from the Achaei arrived in Sicily by boat and as they settled near the border with the Sicanians all together they were named Elymi: their towns were Segesta and Erice.»*

This inspired Virgil to describe the arrival of the Trojan royal family in Erice and the burial of Anchises, by his son Aeneas, on the coast below Erice. Homer (~1000 B.C.), Theocritus (~300 B.C.), Polybius (~200 B.C.), Virgil (~50 B.C.), Horace (~20 B.C.), and others have celebrated this magnificent spot in Sicily in their poems. During seven centuries (XIII-XIX) the town of Erice was under the leadership of a local oligarchy, whose wisdom assured a long period of cultural development and economic prosperity which in turn gave rise to the many churches, monasteries and private palaces which you see today.

In Erice you can admire the Castle of Venus, the Cyclopean Walls (~800 B.C.) and the Gothic Cathedral (~1300 A.D.). Erice is at present a mixture of ancient and medieval architecture. Other masterpieces of ancient civilization are to be found in the neighbourhood: at Motya (Phoenician), Segesta (Elymian), and Selinunte (Greek). On the Aegadian Islands — theatre of the decisive naval battle of the first Punic War (264-241 B.C.) — suggestive neolithic and paleolithic vestiges are still visible: the grottoes of Favignana, the carvings and murals of Levanzo.

Splendid beaches are to be found at San Vito Lo Capo, Scopello, and Cornino, and a wild and rocky coast around Monte Cofano: all at less than one hour's drive from Erice.

**More information about the «Ettore Majorana» Foundation and Centre for Scientific Culture can be found on the WWW at the following address:**
**http://www.ccsem.infn.it**

**M. BUBALLA – A. FAESSLER – C. FISCHER**
**DIRECTORS OF THE COURSE**

**M. BUBALLA – A. FAESSLER – C. FISCHER**
**DIRECTORS OF THE SCHOOL**

**A. ZICHICHI**
**EMFCSC PRESIDENT**